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## **GLOSSARY**

Terms in this glossary are defined based on the context in which they are to be used in this EIS.

**accident**

An unplanned sequence of events that results in undesirable consequences.

**alpha-emitter**

A radioactive substance that decays by releasing an alpha particle.

**alpha particle**

A positively charged particle consisting of two protons and two neutrons, that is emitted during radioactive decay from the nucleus of certain nuclides. It is the least penetrating of the three common types of radiation (alpha, beta, and gamma).

**alpha waste**

Waste containing alpha-emitting transuranic radionuclides with activities between 10 and 100 nanocuries per gram.

**alternative**

A major choice or strategy to address the EIS "Purpose and Need" statement, as opposed to the engineering options available to achieve the goal of an alternative.

**annulus**

The space between the two walls of a double-wall tank.

**applicable or relevant and appropriate requirements (ARARs)**

Requirements, including cleanup standards, standards of control, and other substantive environmental protection requirements and criteria for hazardous substances as specified under Federal and State law and regulations, that must be met when complying with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA).

**aquifer**

A body of permeable rock, rock fragments, or soil through which groundwater moves.

**as low as reasonably achievable (ALARA)**

A process by which a graded approach is applied to maintaining dose levels to workers and the public, and releases of radioactive materials to the environment at a rate that is as far below applicable limits as reasonably achievable.

**atomic number**

The number of positively charged protons in the nucleus of an atom and the number of electrons on an electrically neutral atom.

**background radiation**

Radiation from cosmic sources; naturally occurring radioactive materials, including radon (except as a decay product of source or special nuclear material), and global fallout as it exists in the environment from the testing of nuclear explosive devices.

**backfill**

Material such as soil or sand used in refilling an excavation.

**basemat**

The concrete and steel portion of the tank below the residual material and above the vadose zone.

**beta-emitter**

A radioactive substance that decays by releasing a beta particle.

**beta particle**

A charged particle emitted from a nucleus during radioactive decay, with a mass equal to 1/1837 that of a proton. A negatively charged beta particle is identical to an electron. A positively charged beta particle is called a positron.

**beyond design basis accident (BDBA)**

An accident with an annual frequency of occurring between 1 in 1,000,000 and 1 in 10,000,000 ( $1.0 \times 10^{-6}$  and  $1.0 \times 10^{-7}$ ).

**biodiversity**

Pertains to the variety of life (e.g., plants, animals and other organisms) that inhabits a particular area or region.

**blackwater stream**

Water in coastal plains, creeks, swamp, and/or rivers that has been imparted a dark or black coloration due to dissolution of naturally occurring organic matter from soils and decaying vegetation.

**borosilicate**

A form of glass with silica sand, boric oxide, and soda ash.

**borrow material**

Material such as soil or sand that is removed from one location and used as fill material in another location.

**bounding accident**

A postulated accident that is defined to encompass the range of anticipated accidents and used to evaluate the consequences of accidents at facilities. The most conservative parameters (e.g., source terms, and meteorology) applied to a conservative accident resulting in a bounding accident analysis.

**cancer**

The name given to a group of diseases characterized by uncontrolled cellular growth.

**canister**

A container (generally stainless steel) into which immobilized radioactive waste is placed and sealed.

**capable fault**

In part, a capable fault is one that may have had movement at or near the ground surface at least once within the past 35,000 years, or has had recurring movement within the past 500,000 years. Further definition can be found in 10 CFR 100, Appendix A.

carcinogen

A radionuclide or nonradiological chemical that has been proven or suspected to be either a promoter or initiator of cancer in humans or animals.

characterization

The determination of waste composition and properties, whether by review of process knowledge, nondestructive examination or assay, or sampling and analysis, generally done for the purpose of determining appropriate storage, treatment, handling, transport, and disposal requirements.

chronic exposure

The absorption of hazardous material (or intake of hazardous materials) over a long period of time (for example, over a lifetime).

Code of Federal Regulations (CFR)

A document containing the regulations of Federal executive departments and agencies.

collective effective dose equivalent

Sum of the effective dose equivalents for individuals composing a defined population. The units for this are person-rem or person-sievert.

committed dose equivalent

Total dose equivalent accumulated in an organ or tissue in the 50 years following a single intake of radioactive materials into the body.

committed effective dose equivalent

The sum of committed radiological dose equivalents to various tissues in the body, each multiplied by the appropriate weighing factor and expressed units of rem.

condensate

Liquid that results from condensing a gas by cooling below its saturation temperature.

confining (unit)

A rock layer (or stratum) having very low hydraulic conductivity (or permeability) that restricts the movement of groundwater either into or out of adjacent aquifers.

contaminant

Any gaseous, chemical or organic material that contaminates (pollutes) air, soil, or water. This term also refers to any hazardous substance that does not occur naturally or that occurs at levels greater than those naturally occurring in the surrounding environment (background).

contamination

The deposition of unwanted radioactive material on the surfaces of structures, areas, objects, or personnel.

critical

A condition where in uranium, plutonium or tritium is capable of sustaining a nuclear chain reaction.

criticality

State of being critical. Refers to a self-sustaining nuclear chain reaction in which there is an exact balance between the production of neutrons and the losses on neutrons in the absence of extraneous neutron sources.

**curie (CI)**

The basic unit used to describe the intensity of radioactivity in a sample of material. The curie is equal to 37 billion disintegrations per second, which is approximately the rate of decay of 1 gram of radium. A curie is also a quantity of any radionuclide that decays at a rate of 37 billion disintegrations per second.

**decay, radioactive**

The decrease in the amount of any radioactive material with the passage of time, due to the spontaneous emission from the atomic nuclei of either alpha or beta particles, often accompanied by gamma radiation (see half-life, radioactive).

**decommissioning**

The process of removing a facility from operation followed by decontamination, entombment, dismantlement, or conversion to another use.

**decontamination**

The actions taken to reduce or remove substances that pose a substantial present or potential hazard to human health or the environment, such as radioactive contamination from facilities, soil, or equipment by washing, chemical action, mechanical cleaning, or other techniques.

**design basis accident (DBA)**

For nuclear facilities, a postulated abnormal event that is used to establish the performance requirements of structures, systems, and components that are necessary to maintain them in a safe shutdown condition indefinitely or to prevent or mitigate the consequences so that the general public and operating staff are not exposed to radiation in excess of appropriate guideline values.

**design basis earthquake**

The maximum intensity earthquake that might occur along the nearest fault to a structure. Structures are built to withstand a design basis earthquake.

**DOE Orders**

Requirements internal to the U.S. Department of Energy (DOE) that establish DOE policy and procedures, including those for compliance with applicable laws.

**dosage**

The concentration-time profile for exposure to toxicological hazards.

**dose (or radiation dose)**

A generic term that means absorbed dose, dose equivalent, effective dose equivalent, committed dose equivalent, committed effective dose equivalent, or total effective dose equivalent, as defined elsewhere in this glossary.

**dose equivalent**

Product of the absorbed dose, the quality factor, and any other modifying factors. The dose equivalent is a quantity for comparing the biological effectiveness of different kinds of radiation on a common scale. The unit of dose equivalent is the rem. A millirem is one one-thousandth of a rem.

effective dose equivalent (EDE)

The sum of the products of the dose equivalent to the organ or tissue and the weighting factors applicable to each of the body organs or tissues that are irradiated. It includes the dose from radiation sources internal and/or external to the body and is expressed in units of rem. The International Commission on Radiation Protection defines this as the effective dose.

effluent

Liquid or gaseous waste streams released from a facility.

effluent monitoring

Sampling or measuring specific liquid or gaseous effluent streams for the presence of pollutants.

endemic

Native to a particular area or region.

environmental restoration

Cleanup and restoration of sites and decontamination and decommissioning of facilities contaminated with radioactive and/or hazardous substances during past production, accidental releases, or disposal activities.

environmental restoration program

A DOE subprogram concerned with all aspects of assessment and cleanup of both contaminated facilities in use and of sites that are no longer a part of active operations. Remedial actions, most often concerned with contaminated soil and groundwater, and decontamination and decommissioning are responsibilities of this program.

evaporator

A facility that mechanically reduces the water contents in tank waste to concentrate the waste and reduce storage space needs.

exposure pathways

The course a chemical or physical agent takes from the source to the exposed organism. An exposure pathway describes a unique mechanism by which an individual or population is exposed to chemicals or physical agents at or originating from a release site. Each exposure pathway includes a source or release from a source, an exposure point, and an exposure route. If the exposure point differs from the source, a transport/exposure medium such as air or water is also included.

external accident (or initiator)

An accident that is initiated by manmade energy sources not associated with operation of a given facility. Examples include airplane crashes, induced fires, transportation accidents adjacent to a facility, and so forth.

facility basemat

For this purposes of this EIS, basemat is defined as the concrete pad beneath the HLW tank.

fissile material

Any material fissionable by thermal (slow) neutrons. The three primary fissile materials are uranium-233, uranium-235, and plutonium-239.

floodplain

The level area adjoining a river or stream that is sometimes covered by flood water.



**gamma-emitter**

A radioactive substance that decays by releasing gamma radiation.

**gamma ray (gamma radiation)**

High-energy, short wavelength electromagnetic radiation (a packet of energy) emitted from the nucleus. Gamma radiation frequently accompanies alpha and beta emissions and always accompanies fission. Gamma rays are very penetrating and are best stopped or shielded against by dense materials, such as lead or uranium. Gamma rays are similar to x-rays, but are usually more energetic.

**geologic repository**

A deep (on the order of 600 meter [1,928 feet] or more) underground mined array of tunnels used for permanent disposal of radioactive waste.

**groundwater**

Water occurring beneath the earth's surface in the intervals between soil grains, in fractures, and in porous formations.

**grout**

A fluid mixture of cement-like materials and liquid waste that sets up as a solid mass and is used for waste fixation, immobilization, and stabilization purposes.

**habitat**

The sum of environmental conditions in a specific place occupied by animals, plants, and other organisms.

**half-life**

The time in which half the atoms of a particular radioactive substance disintegrate to another nuclear form. Measured half-lives vary from millionths of a second to billions of years. Also called physical half-life.

**hazard index**

The sum of several hazard quotients for multiple chemicals and/or multiple exposure pathways. A hazard index of greater than 1.0 is indicative of potential adverse health effects. Health effect could be minor temporary effects or fatal, depending on the chemical and amount of exposure.

**hazard quotient**

The ratio of an exposure level to a substance to a toxicity reference value selected for risk assessment purposes.

**hazardous chemical**

A term defined under the Occupational Safety and Health Act and the Emergency Planning and Community Right-to-Know Act as any chemical that is a physical hazard or a health hazard.

**hazardous material**

A substance or material, including a hazardous substance, which has been determined by the U.S. Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce.

hazardous substance

Any substance that when released to the environment in an uncontrolled or unpermitted fashion becomes subject to the reporting and possible response provisions of the Clean Water Act and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

hazardous waste

Under the Resource Conservation and Recovery Act, a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may (a) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (b) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed. Source, special nuclear material, and by-product material, as defined by the Atomic Energy Act, are specifically excluded from the definition of solid waste.

heavy metals

Metallic elements with high atomic weights (for example, mercury, chromium, cadmium, arsenic, and lead) that can damage living things at low concentrations and tend to accumulate in the food chain.

high-efficiency particulate air (HEPA) Filter

A filter with an efficiency of at least 99.95 percent used to separate particles from air exhaust streams prior to releasing that air into the atmosphere.

high-level waste

As defined by the Nuclear Waste Policy Act [42 U.S. C. 10101], High Level Waste means (a) the highly radioactive waste material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid that contains [a combination of transuranic and] fission products [nuclides] in sufficient concentrations; and (b) other highly radioactive material that the [U.S. Nuclear Regulatory] Commission, consistent with existing law, determines by rule requires permanent isolation.

hydrology

The study of water, including groundwater, surface water, and rainfall.

immobilization

A process (e.g., grouting or vitrification) used to stabilize waste. Stabilizing the waste inhibits the release of waste to the environment.

inadvertent intrusion

The inadvertent disturbance of a disposal facility or its immediate environment by a potential future occupant that could result in loss of containment of the waste or exposure of personnel. Inadvertent intrusion is a significant consideration that shall be included either in the design requirements or waste acceptance criteria of a waste disposal facility.

incidental waste

Wastes that are not defined as high-level waste (i.e., originating from nuclear fuel processing).

inhibited water

Water to which sodium hydroxide has been added to inhibit corrosion.

**in situ**

A Latin term meaning “in place.”

**institutional control**

The control of waste disposal sites or other contaminated sites by human institutions in order to prevent or limit exposures to hazardous materials. Institutional control may be accomplished by (1) active control measures, such as employing security guards and maintaining security fences to restrict site access, and (2) passive control measures, such as using physical markers, deed restrictions, government regulations, and public records and archives to preserve knowledge of the site and prevent inappropriate uses.

**internal accidents**

Accidents that are initiated by man-made energy sources associated with the operation of a given facility. Examples include process explosions, fires, spills, criticalities, and so forth.

**involved worker**

Workers that would be involved in a proposed action as opposed to workers that would be on the site of a proposed action but not involved in the action.

**isotope**

One of two or more atoms with the same number of protons, but different numbers of neutrons, in their nuclei. Thus, carbon-12, carbon-13, and carbon-14 are isotopes of the element carbon, the numbers denoting the approximate atomic weights. Isotopes have very nearly the same chemical properties, but often different physical properties (for example, carbon-12 and -13 are stable, carbon-14 is radioactive).

**latent cancer fatality**

A fatality resulting from cancer caused by an exposure to a known or suspected radionuclide or carcinogenic chemical.

**low-level waste (LLW)**

Waste that contains radioactivity and is not classified as high-level waste, transuranic waste, or spent nuclear fuel, or byproduct tailings containing uranium or thorium from processed ore (as defined in Section II e(2) of the Atomic Energy Act).

**low-level mixed waste (LLMW)**

Waste that contains both hazardous waste under the Resource Conservation and Recovery Act and source, special nuclear, or by-product material subject to the Atomic energy Act of 1954 2 USC 2011, *et seq.*).

**macroinvertebrate**

Small animal, such as a larval aquatic insect, that is visible to the naked eye and has no vertebral column.

**maximally exposed individual (MEI)**

A hypothetical individual defined to allow dose or dosage comparison with numerical criteria for the public. This individual is located at the point on the DOE site boundary nearest to the facility in question.

**millirad**

One thousandth of a rad (see rad).

millirem

One thousandth of a rem (see rem).

mixed waste

Waste that contains both hazardous wastes under the Resource Conservation and Recovery Act and source, special nuclear, or by-product material subject to the Atomic Energy Act of 1954.

nanocurie

One billionth of a curie (see curie).

natural phenomena accidents

Accidents that are initiated by phenomena such as earthquakes, tornadoes, floods, and so forth.

noninvolved workers

Workers in a fixed population outside the day-to-day process safety management controls of a given facility area. In practice, this fixed population is normally the workers at an independent facility area located a specific distance (often 100 meters) from the reference facility area.

nuclear criticality

A self-sustaining nuclear chain reaction.

nuclide

A general term referring to all known isotopes, both stable (279) and unstable (about 5,000), of the chemical elements.

offsite

Away from the SRS site.

offsite population

For facility accident analyses, the collective sum of individuals located within an 80-kilometer (50-mile) radius of a facility and within the path of the plume with the wind blowing in the most populous direction.

oxalic acid

A water soluble organic acid,  $\text{H}_2\text{C}_2\text{O}_4$ , being considered as a cleaning agent to use in spray-washing tanks because it dissolves sludge and is only moderately aggressive against carbon steel, the material used in the construction of the waste tanks.

particulate

Pertains to minute, separate particles. An example of dry particulate is dust.

performance objectives

Parameters within which a facility must perform to be considered acceptable.

permanent disposal

For high level waste the term means emplacement in a repository for high-level radioactive waste, spent nuclear fuel, or other highly radioactive material with no foreseeable intent of recovery, whether or not such emplacement permits the recovery of such waste.

permeability

The degree of ease with which water can pass through a rock or soil.

**person-rem**

A unit used to measure the radiation exposure to an entire group and to compare the effects of different amounts of radiation on groups of people. It is obtained by multiplying the average dose equivalent (measured in rems) to a given organ or tissue by the number of persons in the population of interest.

**pH**

A measure of the relative acidity or alkalinity of a solution. A neutral solution has a pH of 7, acids have a pH of less than 7, and bases have a pH of greater than 7.

**picocurie**

One trillionth of a curie (see curie).

**pollutant migration**

The movement of a contaminant away from its initial source.

**population**

For risk assessment purposes, population consists of the total potential members of the public or workforce who could be exposed to a possible radiation or chemical dose from an exposure to radionuclides or carcinogenic chemicals.

**population dose**

The overall dose to the offsite population.

**rad**

The special unit of absorbed dose. One rad is equal to an absorbed dose of 100 ergs/gram.

**radiation (ionizing radiation)**

Alpha particles, beta particles, gamma rays, x-rays, neutrons, high-speed electrons, high-speed protons, and other particles capable of producing ions. Radiation, as it is used here, does not include nonionizing radiation such as radio- or microwaves, or visible, infrared, or ultraviolet light.

**radiation worker**

A worker who is occupationally exposed to ionizing radiation and receives specialized training and radiation monitoring devices to work in such circumstances.

**radioactive waste**

Waste that is managed for its radioactive content.

**radioactivity**

The property or characteristic of material to spontaneously "disintegrate" with the emission of energy in the form of radiation. The unit of radioactivity is the curie (or becquerel).

**radioisotope**

An unstable isotope of an element that decays or disintegrates spontaneously, emitting radiation. approximately 5,000 natural and artificial radioisotopes have been identified.

radionuclide

The radioisotopes that together comprise 95 percent of the total curie content of a waste package by volume and have a half-life of at least 1 week. Radionuclides that are important to a facility's radiological performance assessment and/or a safety analysis and are listed in the facility's waste acceptance criteria are considered major radionuclides.

Record of Decision (ROD)

A public document that records the final decision(s) concerning a proposed action.

reducing grout

A grout formulated to behave as a chemical reducing agent. A chemical reducing agent is a substance that reduces other substances (i.e., decreases their positive charge or valence) by supplying electrons. The purpose of a reducing grout in closure of the high-level waste tanks would be to provide long-term chemical durability against leaching of the residual waste by water. Reducing grout would be com

posed primarily of cement, blast furnace slag, masonry sand, and silica fume.

rem

A unit of radiation dose that reflects the ability of different types of radiation to damage human tissues and the susceptibility of different tissues to the damage. Rems are a measure of effective dose equivalent.

risk

Quantitative expression of possible loss that considers both the probability that a hazard causes harm and the consequences of that event.

Safety Analysis Report (SAR)

A report, prepared in accordance with DOE Orders 5481.1B and 5480.23, that summarize the hazards associated with the operation of a particular facility and defines minimum safety requirements.

saltcake

Salt compounds that have crystallized as a result of concentrating the liquid.

saltstone

Concrete-like substance formed when the low-activity fraction of high-level waste is mixed with cement, flyash, and slag.

seep line

An area where subsurface water or groundwater emerges from the earth and slowly flows overland.

segregation

The process of separating (or keeping separate) individual waste types and/or forms in order to facilitate their cost-effective treatment and storage or disposal.

seismicity

The phenomenon of earth movements; seismic activity. Seismicity is related to the location, size, and rate of occurrence of earthquakes.

sludge

Solid material that precipitates or settles to the bottom of a tank.

**solvent**

Substance (usually liquid) capable of dissolving one or more other substances.

**source material**

(a) Uranium, thorium, or any other material that is determined by the U.S. Nuclear Regulatory Commission pursuant to the provisions of the Atomic Energy Act of 1954, Section 61, to be source material; or (b) ores containing one or more of the foregoing materials, in such concentration as the U.S. Nuclear Regulatory Commission may by regulation determine from time-to-time [Atomic Energy Act 11(z)]. Source material is exempt from regulation under the Resource Conservation and Recovery Act.

**source term (Q)**

the quantity of radioactive material released by an accident or operation that causes exposure after transmission or deposition. Specifically, it is that fraction of respirable material at risk (MAR) that is released to the atmosphere from a specific location. The source term defines the initial condition for subsequent dispersion and consequence evaluations.  $Q = \text{material at risk (MAR)} \times \text{damage ratio (DR)} \times \text{airborne release fraction (ARF)} \times \text{respirable fraction (RF)} \times \text{leak path factor (LPF)}$ . The units of Q are quantity at risk averaged over the specified time duration.

**spent nuclear fuel**

Fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated.

**stabilization**

Treatment of waste to protect the environment from contamination. This includes rendering a waste immobile or safe for handling and disposal.

**subsurface**

The area below the land surface (including the vadose zone and aquifers).

**tank farm**

An installation of multiple adjacent tanks, usually interconnected for storage of liquid radioactive waste.

**total effective dose equivalent**

The sum of the external dose equivalent (for external exposures) and the committed effective dose equivalent (for internal exposures).

**transuranic waste**

Waste containing more than 100 nanocuries of alpha-emitting transuranic isotopes, with half-lives greater than 20 years, per gram of waste, except for (a) high-level radioactive waste; (b) waste that the U.S. Department of Energy has determined, with the concurrence of the Administrator of the U.S. Environmental Protection Agency, does not need the degree of isolation required by 40 CFR 191; or (c) waste that the U.S. Nuclear Regulatory Commission has approved for disposal on a case-by-case basis in accordance with 10 CFR 61.

**treatment**

Any activity that alters the chemical or physical nature of a hazardous waste to reduce its toxicity, volume, mobility or to render it amenable for transport, storage or disposal.

vadose zone

The zone between the land surface and the water table. Saturated bodies, such as perched groundwater, may exist in the vadose zone. Also called the zone of aeration and the unsaturated zone.

vittrification

A method of immobilizing waste (e.g., radioactive, hazardous, and mixed). This involves adding frit and waste to a joule-heated vessel and melting the mixture into a glass. The purpose of this process is to permanently immobilize the waste and to isolate it from the environment.

volatile organic compound (VOC)

Compounds that readily evaporate and vaporize at normal temperatures and pressures.

waste minimization

An action that economically avoids or reduces the generation of waste by source reduction, reducing the toxicity of hazardous waste, improving energy usage, or recycling. These actions will be consistent with the general goal of minimizing present and future threats to human health, safety, and the environment.

waste stream

A waste or group of wastes with similar physical form, radiological properties, U. S. Environmental Protection Agency waste codes, or associated land disposal restriction treatment standards. It may be the result of one or more processes or operations.

wetlands

Area that are inundated or saturated by surface water or groundwater and that typically support vegetation adapted for life in saturated soils. Wetlands generally include swamps, marshes, bogs, and similar areas.

wind rose

A star-shaped diagram showing how often winds of various speeds blow from different directions. This is usually based on yearly average.



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